MARSHALL, P., 1924. The "Hydraulic Limestones" of North Auckland. *Trans. N.Z. Inst.*, 55, pp. 617–8.

MARSHALL, P., SPEIGHT, R., and COTTON, C. A., 1910. The Younger Rock-Series of New Zealand. *Trans. N.Z. Inst.*, 43, pp. 378–407.

PARK, J., 1886. On the Kaipara District. *R. G. E. during 1885*, no. 17, pp. 164–170.

——— 1887. Kaipara and Wade Districts, Auckland. *R. G. E. during 1886–7*, no. 18, pp. 219–229.

——— 1903. On the Age and Relations of the New Zealand Coalfields. *Trans. N.Z. Inst.*, 36, pp. 405–518.

WELLMAN, H. W., 1947. Load Metamorphism—The Problem of Rank from the Point of view of the Field Geologist. Paper delivered at the 6th Science Congress, N.Z. Roy. Soc., 22nd May, 1947.

NOTES ON A COMPARISON OF THE TERTIARY AND RECENT BRACHIOPODA OF NEW ZEALAND AND SOUTH AMERICA

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WHILE in the United States of America in 1946, I was able to study collections of Patagonian Tertiary Brachiopods. I had available through the courtesy of Professor B. F. Howell, of Princeton University, the extensive collections made by the Princeton University Expedition to Patagonia in 1896-99, and smaller collections from various sources, housed in the American Museum of Natural History, New York, and in the United States National Museum, Washington D.C.

It seems hardly profitable to detail and discuss now the claims of the earlier workers for specific identity of South American and New Zealand Tertiary brachiopods. It will be sufficient to start from the conclusions reached and summarised in J. A. Thomson's "Brachiopod Morphology and Genera (Recent and Tertiary)", and to discuss the validity of his views that a number of genera were or are common to the South American (including for this purpose, the American quadrant of Antarctica), and New Zealand areas during Tertiary and Recent times.

According to Thomson (1927) the following genera fall into this category:— *Lingula, Crania, Tegulorhynchia, Terebratulina, Liothyrella, Stethothyris, Pachymagas, Magella, Terebratella,* and *Magellania.*

Of these genera, the only ones which as a result of re-study, I admit to have the distribution stated, are *Lingula, Crania, Terebratulina,* and *Liothyrella. Lingula, Crania,* and *Terebratulina* are long-ranging genera, both in time and space, and have no special significance from the distributional point of view. *Liothyrella,* the type of which was described from South Mexican waters, occurs Recent in Magellan district, has a circumpolar distribution, and is found both Recent and Tertiary in New Zealand and in the Tertiary of Australia. These Terebratulids merit further study. I suspect that several generic stocks are involved.

Tegulorhynchia. According to Thomson, occurs Recent and Tertiary in New Zealand; in the Tertiary of Australia; fossil at Cockburn Island, whence Buckman recorded a New Zealand species (based incidentally, on a single, imperfect specimen); in the Patagonian stage of Patagonia; in the Pliocene of Belgium; and as a Recent genus at Kerguelen Island, and in Japanese waters. Study of the Patagonia fossil shows that it is multicostate on a capillate shell and therefore not a *Tegulorhynchia.* I have made it the type of a new genus.

The remaining genera are all Terebratellids.

Stethothyris. Thomson gave the distribution as Tertiary of New Zealand, Australia and Patagonia, with a single Recent species from the Davis Sea, Antarctica. In 1940 I placed the Antarctic and Australian species in a new genus *Victorithyris.* Study of the sole Patagonia species referred by Thomson to *Stethothyris* suggests that it is an early *Pachymagas.* I conclude that *Stethothyris* is restricted to New Zealand.

Pachymagas. I was able to examine a series of growth stages and to work out the ontogeny of the cardinalia in *Terebratella gigantea* Ortmann with which the genotype of *Pachymagas* appears to be identical. This species has clearly developed excavate hinge-plates. I conclude that *Pachymagas* is restricted to South America and that the New Zealand species so named are not closely related. There are several stocks among the many species of *Pachymagas* described from the Dominion.

Magella. Apart from the New Zealand genotype, Thomson referred here two Tertiary species described by Buckman from Cockburn Island, Antarctica. I have not seen specimens, but suggest that they merit re-study.

Terebratella. The type of *Terebratella* is *T. dorsata* (Gmelin) from the Magellan region, and the species has Patagonian ancestors in South America. The New Zealand Recent species placed here are sufficiently distinct to require generic separation. There are two lineages, both of which have a long Tertiary history in New Zealand. The multicostate *T. sanguinea* (Leach), is a very conservative group. Specimens which are difficult to separate specifically occur as early as the Duntroonian stage, and *T. radiata* Hutton, is a still earlier representative. The generic name *Magasella* Dall [type: *Terebratula evansii* Davidson = *Terebratella sanguinea* (Leach)] is available for this stock. *Terebratula inconspicua* Sowerby, a second Recent species, is the end-point of a distinct lineage which is probably derived from the mid-Tertiary *Magella carinata* Thomson. Throughout its history it lacks multicostation. For this smooth lineage the name *Waltonia* Davidson is available (type: *Waltonia valenciennesi* Davidson = *Terebratula inconspicua* Sowerby).

Magellania. The distribution of this genus as given by Thomason includes Tertiary and Recent in Australia; Recent at the Macquarie Islands, Antarctica and Falkland Islands, and the Magellanic district. The Antarctica and Macquarie Island species have been placed by me in the new genus *Aerothyris.* *Anomia venosa* Solander, the sole South American species, is related to Patagonian Tertiary species such as *Terebratula patagonica* Sowerby, and I propose to separate the stock generically. I conclude that *Magellania* is a purely Australian group.

The results given tersely above are summarised from manuscript which on publication will include synonyms, full descriptions and illustrations.

The general result of my re-study of the Patagonian Tertiary brachiopoda, combined with concurrent investigation of other austral faunas both Recent and Tertiary, leads me to conclude that the brachiopod faunas of South America, Australia and New Zealand, while characterised by the presence of the typically austral Terebratellids, have been virtually isolated from each other throughout Tertiary time.

The distribution of the brachiopoda is not such as to demand any shallow-water connection between South America and New Zealand in Tertiary times. The distribution and nature of the austral brachiopod faunas is consistent with derivation from a common Cretaceous stock, but whether this was distinctly southern, or partly Tethyan, or both, remains to be demonstrated.

It is interesting to record that this conclusion agrees exactly with that arrived at by Marwick from studies of the Tertiary mollusca of New Zealand. In criticising Hutton's claim (1904) for a Tertiary shallow-water connection between South America and New Zealand, Marwick (1925) wrote, "Such resemblances as do occur can safely be attributed to the normal development of similar Cretaceous forms. There is no need to postulate a shallow-water connection during the Tertiary."

FOSSIL SPORES FROM NEW ZEALAND COALS

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Introduction.

Terminology. Spores are highly specialised, reproductive cells of plants. The term spore, used in a broad sense, includes spores (*sensu strictu*), microspores, pollen grains, and megaspores (or macrosporcs).

Spores (*sensu strictu*), are the asexual reproductive bodies of the lower groups of plants such as fungi, mosses, and many ferns.

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